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TOBACCO MOSAIC VIRUS

J. J. McRitchie

Tobacco mosaic virus (TMV) is the most investigated plant virus. In fact, it has been more important for basic research than as a causal agent of disease (4). Nevertheless, it can have a considerable impact upon the yield of several crops, particularly when plants are infected in their early stages of growth. The disease is common in tobacco, tomato, pepper, eggplant, petunia, and nearly all solanaceous plants (5).

TMV is a member of the tobamovirus group, which also includes Odontoglossun ringspot virus, and possibly Sammon's Opuntia virus (4). The group is characterized by rigid rod-shaped particles about 8 nm x 300 nm composed of identical protein subunits packed in a helix. One continuous single strand of RNA follows the same helix. The virus particles can be dissociated into the nucleic acid and protein, and reconstituted into infective virus (4, 6).

The virus is highly stable, remaining infective for decades (6). It is easily transmitted by sap, but not by insects, and is very heat stable, retaining some infectivity even after 10 minutes at 90°C (194°F). The virus induces several types of inclusions that can he observed with a light microscope. The most unique and diagnostic type consists of aggregates of virus particles layered on top of one another in the shape of hexagonal crystals. These crystals may be observed after staining with Azure A and heating (l). Tobacco mosaic was first described in 1886, and in 1935 Stanley was awarded the Nobel prize for crystallizing the virus into infectious particles. It is found wherever tobacco is grown.

Fig. 1. Tobacco mosaic on Turkish tobacco, showing characteristic mottled areas of light and dark green.

The virus overwinters in several solanaceous weeds and persists in air-dried tobacco, including chewing and smoking tobacco. It has been found in 116 plant species. It is disseminated mechanically during the course of normal field operations.

SYMPTOMS. In tobacco, the first symptoms are a veinclearing of the youngest leaves. The leaves then become mottled and somewhat distorted. Eventually, large blister-like areas of green tissue and sunken yellow areas develop, accompanied by mottled areas of light and dark green, with severe distortion (Fig. 1). These symptoms may be confused with chemical damage (2).

CONTROL. Virus-free transplants should be used, and any plants showing mosaic symptoms should be rogued prior to the first cultivation. Workers should avoid the use of tobacco products, and should wash hands and forearms with soap and water before entering tobacco fields. Weeds should be controlled in and around plant beds (2, 3).

SURVEY AND DETECTION. Look for plants with leaves which are blotched with yellow-green and dark green areas which may also be distorted. Submit entire plant when possible. Laboratory diagnosis is essential for positive diagnosis.

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Contribution No. 502, Bureau of Plant Pathology, P.O. Box 1269, Gainesville, FL 32608